



**ENVIRONMENTAL SYSTEMS
STANDARD LEVEL
PAPER 1**

Thursday 11 May 2000 (afternoon)

45 minutes

INSTRUCTIONS TO CANDIDATES

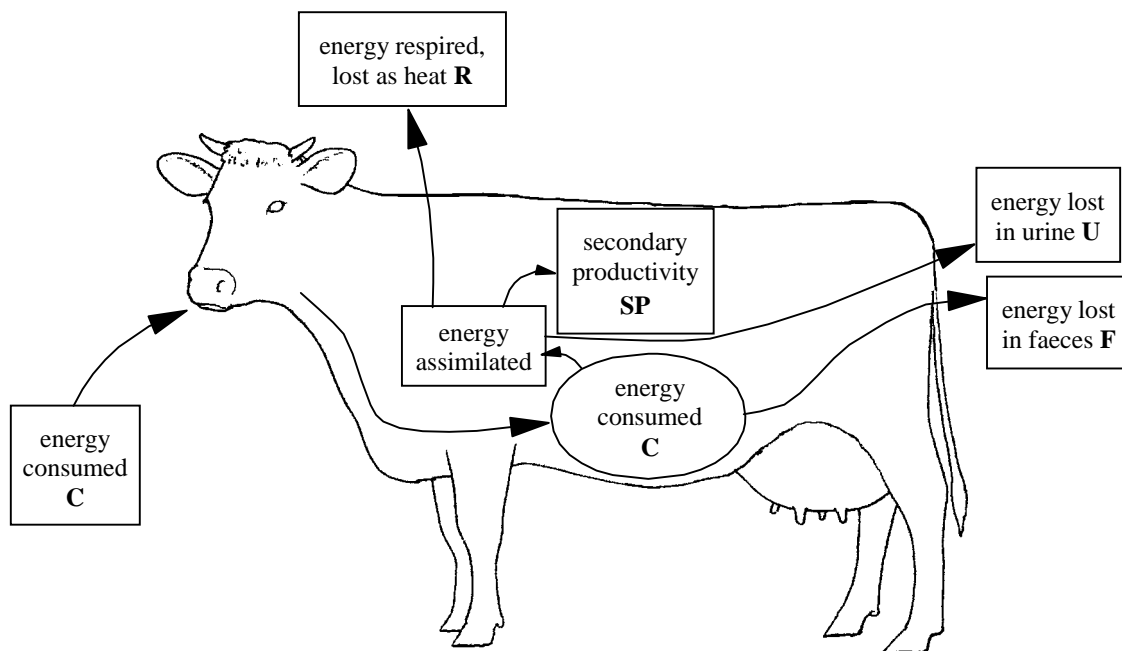
- Do not open this examination paper until instructed to do so.
- Answer all the questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.

1. Which of the following is a characteristic of K-selected organisms?
 - A. They are typical of pioneer communities.
 - B. Usually a very high percentage of young die during the early part of their life cycle.
 - C. Sexual maturity is reached early in the lifespan.
 - D. They usually have a high degree of parental care of young.

2. Leaching of soil nutrients is an example of
 - A. transfer of materials.
 - B. transformation of materials.
 - C. transfer of energy.
 - D. transformation of energy.

3. The Second Law of Thermodynamics states that in any
 - A. open system, entropy tends to increase spontaneously.
 - B. open system, entropy tends to decrease spontaneously.
 - C. isolated system, entropy tends to increase spontaneously.
 - D. isolated system, entropy tends to decrease spontaneously.

Questions 4 to 5 refer to the diagram below which shows energy transfer in a cow.



4. Secondary Productivity (SP) is

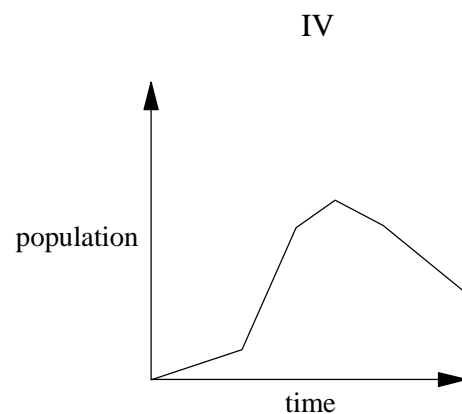
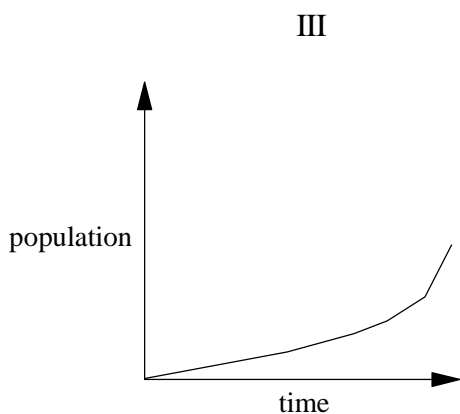
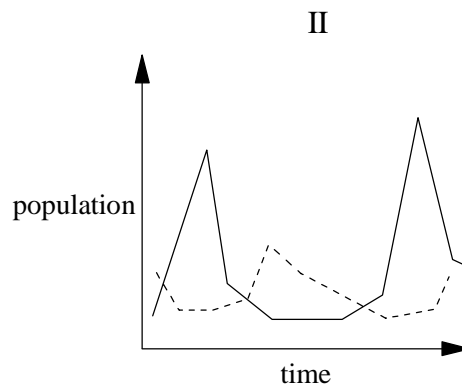
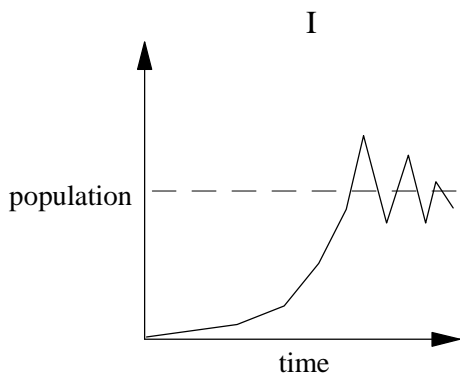
- A. $C + R$.
- B. $C - (R + U + F)$.
- C. $C - (U + F)$.
- D. $C + R + U + F$.

5. If $C = 4000 \text{ kJ day}^{-1}$ and $SP = 200 \text{ kJ day}^{-1}$, the efficiency of conversion is

- A. 50 %.
- B. 10 %.
- C. 5 %.
- D. 2 %.

6. Modern commercial agricultural practices tend to
- A. lower species diversity in the community.
 - B. reproduce early stages of succession to maximise net productivity.
 - C. create conditions favourable for r-selected species.
 - D. do all the above.
7. Which is an example of negative feedback?
- A. Loss of vegetation leading to soil erosion leading to further loss of vegetation.
 - B. A decline in a large predator population after they have eaten most of their prey population.
 - C. Melting of permafrost in the tundra due to climatic change leading to further release of methane, causing further change.
 - D. Unsustainable slash and burn agriculture practices in tropical rain forests.

8. The graphs below show four different population growth curves.
Which best represents (i) the total human population;
(ii) a bacterial population in a laboratory;
(iii) a predator/prey relationship?



- | | (i) | (ii) | (iii) |
|----|-----|------|-------|
| A. | III | I | IV |
| B. | III | IV | II |
| C. | IV | III | II |
| D. | I | IV | I |

9. Ocean currents are an important mechanism for the transfer of energy from
- the polar regions towards low latitudes.
 - the high latitudes towards the equator.
 - low latitudes towards high latitudes.
 - southern polar regions to northern polar regions.

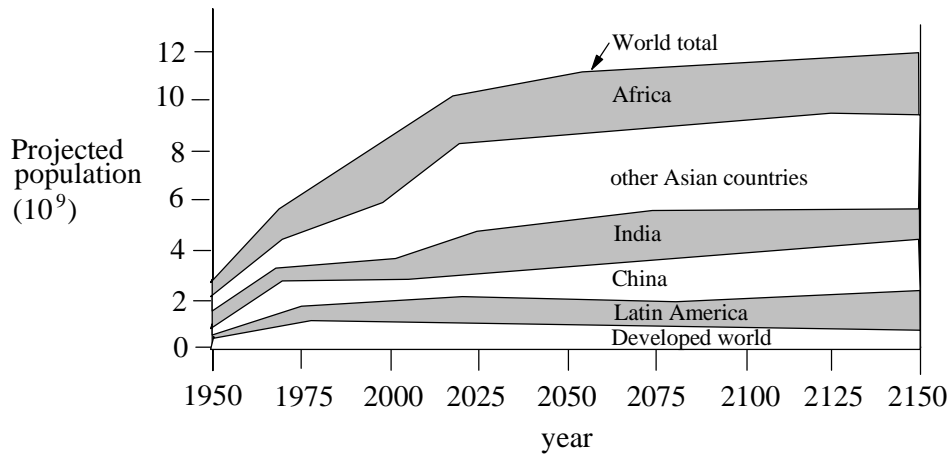
10. Which list below contains only components of **renewable** natural capital?

- A. Fish, timber, cattle
- B. Methane, the ozone layer, water vapour
- C. Groundwater, hydroelectric power, solar energy
- D. Rice, whales, diamonds

11. The Earth's mantle is

- A. beneath the crust and the core.
- B. between the core and the crust.
- C. above the crust but beneath the core.
- D. above both the core and the crust.

Question 12 and 13 refer to the graph below which shows human population projections by region.



12. By approximately how many times is the world population in 2125 expected to exceed the population in 1950?

A. 5
B. 4
C. 3
D. 2

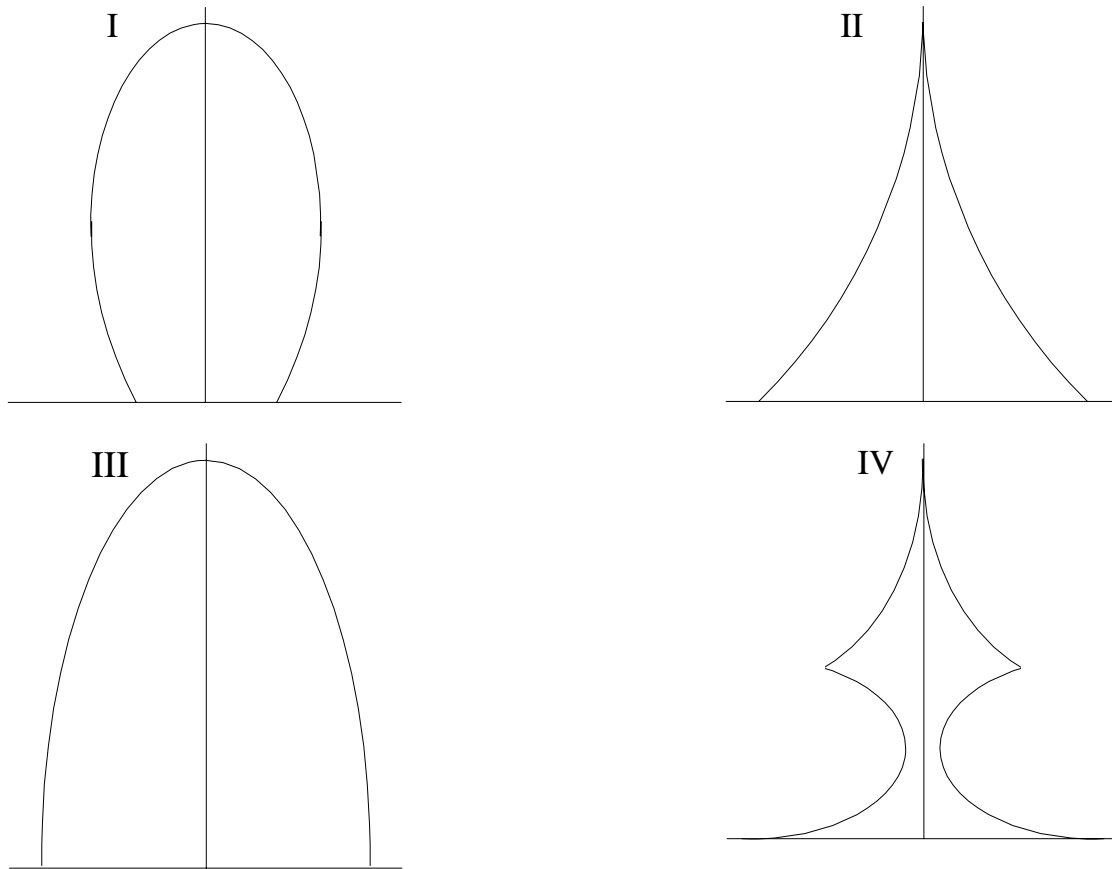
13. The projected populations from year 2000 to 2125 are:

	Africa	China	Developed World	Latin America
A.	Rising	Rising	Falling	Rising
B.	Rising	Stable	Falling	Falling
C.	Stable	Stable	Stable	Falling
D.	Rising	Rising	Falling	Stable

14. Which interaction would benefit both organisms in a relationship?

A. Predation
B. Commensalism
C. Mutualism
D. Competition

Questions 15 and 16 refer to the models of population pyramids below.



15. The correct labels for axes in population pyramids are

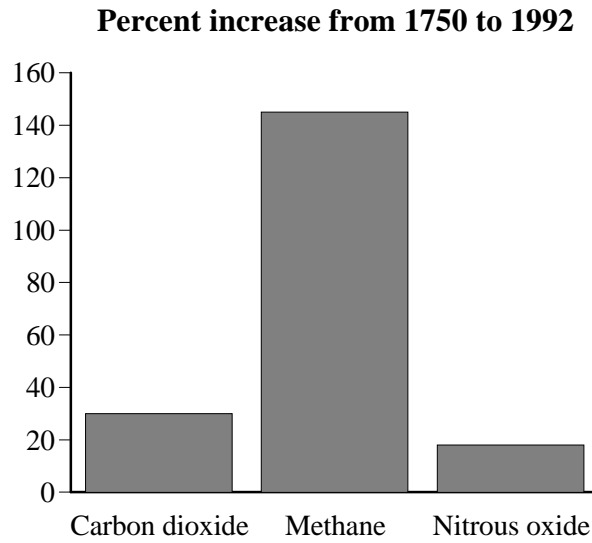
	x-axis	y-axis
A.	age range	percentage of population
B.	population size	survival rate
C.	survival rate	population size
D.	percentage of population	age range

16. Match each population pyramid with the appropriate description.

	I	II	III	IV
A.	Expanding	Contracting	Stable	Expanding
B.	Contracting	Expanding	Stable	Expanding with short-term interruption
C.	Stable	Contracting	Contracting	Expanding
D.	Contracting	Expanding with short-term interruption	Contracting	Expanding with short-term interruption

17. Overpopulation occurs when
- A. the population level allows resources to be used sustainably, giving a good standard of living to all.
 - B. there are too few people in an area to use the resources.
 - C. resources are being used at a rate that allows them to be replaced for further harvesting.
 - D. the available resources cannot support the number of people in the area at a reasonable standard of living.
18. In a survey of an antelope population, 80 antelope were marked and released. Two weeks later a second sample was captured, of which 16 antelope were found unmarked and 4 were marked. What would be the estimated population size?
- A. 100
 - B. 200
 - C. 400
 - D. 1600
19. Which of the following statements is correct?
- A. Ozone gas is increasing in the upper atmosphere through the action of CFCs
 - B. Ozone gas is increasing in the upper atmosphere because of global warming
 - C. Ozone gas is decreasing in the upper atmosphere because of the increase in the amount of nitrogen oxides produced by the combustion of fossil fuels
 - D. None of the above statements is correct
20. Which of the following groups of organisms can convert ammonium and nitrate ions into amino acids?
- A. Producers
 - B. Primary consumers
 - C. Decomposers
 - D. Top carnivores

Questions 21 and 22 refer to the data below.



(Source: IPCC. Summary for policymakers of the contribution of working group I to the IPCC second assessment report, 1995. Intergovernmental Panel on Climate Change. In *WWF Data Bulletin on Climate Change*.)

- 21.** These gases cause the Greenhouse Effect because they are
- A. more effective at absorbing long-wave radiation than other gases in the atmosphere.
 - B. more effective at absorbing short-wave radiation than other gases in the atmosphere.
 - C. produced by human activities.
 - D. not broken down in the atmosphere.
- 22.** Greenhouse gases not listed above are
- I. sulfur dioxide.
 - II. CFCs.
 - III. low level (tropospheric) ozone.
 - IV. water vapour.
- A. II and III
 - B. II, III and IV
 - C. I, II and III
 - D. I, II, III and IV

23. Net Primary Production is the amount of energy

- A. produced from ‘alternative’ sources in developing countries.
- B. fixed in an ecosystem by photosynthesis.
- C. fixed in an ecosystem by photosynthesis, minus the losses due to respiration by producer organisms.
- D. fixed by the herbivores in an ecosystem.

24. Two ecosystems have the following abundance of species:

	Number of individuals		
	Species P	Species Q	Species R
Ecosystem X	95	3	2
Ecosystem Y	33	33	34

Which of the statements below is correct?

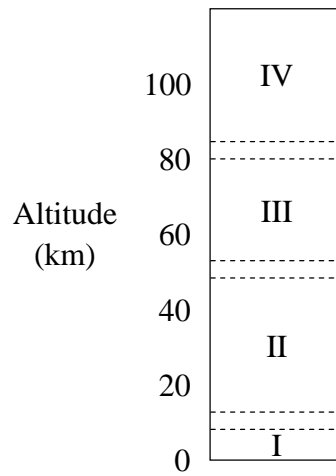
- A. Ecosystem X has the highest species diversity as one species is more numerous than the other
- B. Ecosystem Y has the highest species diversity because this is a measure of both the number of species and their abundance
- C. The species diversity of both ecosystems is equal as they both have three species
- D. Ecosystem Y has the highest species diversity because there is no competition between species

25. Which of these statements is correct?

- A. The formation of ozone involves the absorption of ultra-violet radiation
- B. Ozone is destroyed by carbon dioxide released by burning fossil fuels
- C. The type of ultra-violet radiation absorbed by the ozone layer does not affect living organisms
- D. Chlorofluorocarbons in the stratosphere are rapidly broken down allowing them to escape into the outer atmosphere

26. A lake with a stream flowing into it, but with water lost only by evaporation, is an example of a system which is
- A. isolated.
 - B. stable and closed.
 - C. unstable and closed.
 - D. open.
27. Most food chains seldom have more than four trophic levels because
- A. in most ecosystems, competition for food is very great.
 - B. the total biodiversity in any ecosystem is limited.
 - C. energy is lost as it moves along a food chain and little remains at the level of the top carnivore.
 - D. in many parts of the world, many species have become extinct and complex ecosystems are rare.
28. Natural Increase Rate of a human population is
- A. number of immigrants per year.
 - B. number of immigrants – number of emigrants per year .
 - C. $\frac{\text{crude birth rate} - \text{crude death rate}}{10}$.
 - D. $\frac{\text{crude birth rate} + \text{crude death rate}}{10}$.

Questions 29 and 30 refer to the graph below.



29. The highest concentration of ozone is between

- A. 0–10 km.
- B. 10–20 km.
- C. 20–40 km.
- D. 40–80 km.

30. The troposphere is

- A. I.
- B. II.
- C. III.
- D. IV.